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APPLICATION NO.		FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,390	<u></u>	09/12/2000	Akihiro Nitayama	00629.00002	6915
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BANNER & WITCOFF			EXAMINER		
1001 G STRI SUITE 1100			WEISS, HOWARD		
WASHINGTON, DC 20001				ART UNIT	PAPER NUMBER
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				DATE MAIL ED: 12/20/2002	

Please find below and/or attached an Office communication concerning this application or proceeding.

1) Responsive to communication(s) filed on 01 August 2002. 2a) This action is FINAL. 2b) This action is non-final. 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 453 O.G. 213. Disposition of Claims 4) Claim(s) 2-12 and 18 N/are pending in the application. 4a) Of the above claim(s) is/are withdrawn from consideration. 5) Claim(s) is/are allowed. 6) Claim(s) 2-12 and 18 N/are rejected. 7) Claim(s) is/are objected to. 8) Claim(s) are subject to restriction and/or election requirement. Application Papers 9) The specification is objected to by the Examiner. 10) The drawing(s) filed on is/are: a) accepted or b) objected to by the Examiner. Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). 11) The proposed drawing correction filed on is: a) approved by the Examiner. If approved, corrected drawings are required in reply to this Office action. 12) The oath or declaration is objected to by the Examiner. Priority under 35 U.S.C. §§ 119 and 120 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f). a) All b) Some * c) None of: 1. Certified copies of the priority documents have been received in Application No 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rul 17.2(a)). 4 See the attached detailed Office action for a list of the certified copies not received. 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application). a) The translation of the foreign language provisional application has been received.	,		
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Attorney's Docket Number: 00629.00002

Filing Date: 9/12/00

Continuing Data: CIP of 08/982,478 (12/2/97) Now U.S. Patent No. 6,236,079

RCE established 8/1/02

Claimed Foreign Priority Date: none

Applicant(s): Nitayama et al. (Katsuhiko, Ishibashi, Kohyama)

Examiner: Howard Weiss

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/1/02 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- 3. Claims 12 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Park et al. (U.S. Patent No. 5,521,115).

Park et al. show all aspects of the instant invention (e.g. Figures 2 to 10) including:

a semiconductor substrate 10

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 an element isolation insulating film including a first insulating film 56 buried to define an active element area and a second insulating film 80 shallower, wider and position over the first film

- elements including a capacitor node 55 formed in a trench 22
- contact layer contacting 55' said node and 26 an under side of the second insulating film and a side the first insulating film.

Claim Rejections - 35 USC § 103

- 4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 2 and 6 to 10 are rejected under 35 U.S.C. § 103(a) as obvious over Park et al. and Lu (U.S. Patent No. 5,843,820).

Park et al. show most aspects of the instant invention (Paragraph 3) including:

a semiconductor substrate 10

- a plurality of trench capacitors with node layers 55 and arranged at a regular pitch
- a semiconductor layer comprising a first layer 32 and a second layer 58 formed
 on said first layer
- an element isolation insulating film 30 buried in said semiconductor layer and defining active element areas over two adjacent trench capacitors
- two transistors 14 which share one 18 source/drain diffusion layer and an other
 20 source/drain layer
- each transistor's gate 16, 62 connected a word line continuous in one direction
- a contact layer 26 for connecting the other source/drain layer to the node layers and bit line contacts 78

Park et al. do not explicitly show bit lines intersecting the word lines. However, it is common in the art to form bit lines to intersect word lines and Park et al. generally state that it is left to one of ordinary skill to construct such lines (Column 8 Lines 54 to 61).

Park et al. do not show the other source/drain layer positioned over said trenches. Lu teaches (e.g. Figure 12) to form source/drain layer 17 over a trench capacitor node 50 and to have the contact layer 66 buried in said substrate 40 to increase capacitor capacitance (Column 4 line 40 to 44). It would have been obvious to a person of ordinary skill in the art at the time of invention to form source/drain layer over a trench capacitor node and to have the contact layer buried in said substrate 40 as taught by Lu in the device of Park et al. to increase capacitor capacitance.

6. Claim 11 is rejected under 35 U.S.C. § 103(a) as obvious over Park et al. and Lu, as applied to Claim 2 above, and in further view of Bronner et al. (U.S. Patent No. 5,606,188).

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Park et al. and Lu show most aspects of the instant invention (Paragraph 5) except for the substrate isolation insulating film made of two films as claimed. Bronner et al. teach (e.g. Figure 1) to make two layer isolation films **14,16** as claimed to allow scalability below 2 volts (Column 1 Lines 43 to 45). It would have been obvious to a person of ordinary skill in the art at the time of invention to make two layer isolation films as taught by Bronner et al. in the device of Park et al. and Lu to allow scalability below 2 volts.

7. Claims 3 to 5 are rejected under 35 U.S.C. § 103(a) as obvious over Park et al. and Lu, as applied to Claim 2 above, and in further view of Ishii (U.S. Patent No. 5,250,831).

Park et al. and Lu show most aspects of the instant invention (Paragraph 5) except for the trench capacitors shaped substantially in a square with sides equal to 2F, either the diagonals or the sides of said squares being oriented in two orthogonal directions of said word and bit lines and arranged at the pitch as claimed. Ishii teaches to have trench capacitors 8 in a square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word 20b and bit 20a lines to achieve high integration of the memory cells in a DRAM (Column 3 Lines 29 to 31). It would have been obvious to a person of ordinary skill in the art at the time of invention to have trench capacitors 8 in a square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word and bit lines as taught by Ishii et al. in the device of Park et al. and Lu to achieve high integration of the memory cells in a DRAM.

In reference to the dimensions of the sides of the trench capacitors, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the dimensions of the trench capacitors equal to the minimum processing dimension, since it has been held that discovering an optimum value of a

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result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

8. The Applicants' arguments with respect to Claims 2 to 12 and 18 have been considered but are most in view of the new ground(s) of rejection.

Conclusion

- 9. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is (703) 308-7722 or -7724. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, (703) 872-9318, and After-Final, (703) 872-9319, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.
- 10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at (703) 308-0956.

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11. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/ 301, 305	thru 12/23/02
Other Documentation: none	
Electronic Database(s): EAST, IEL	thru 12/23/02

Howard Weiss Patent Examiner Art Unit 2814

HW/hw 24 December 2002